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(54) Cowling for stay and furled sail of sailing boat

(57) A cowling 14 is for a stay 16, particularly the forestay, of a sail 22 in a sailing boat (11, Fig 3 not shown). The stay extends between the hull (10) of the boat and a mast (12) thereof, and supports a leading edge of the sail. The stay 16 may have a furling drum (28) to enable furling of the sail around the stay. The cowling 14 comprises a substantially rigid tubular element 30 extending between the drum and the mast of the boat. A slot 36 extends along at least part the length of the cowling and is of a width slightly larger than the thickness of the sail. The cowling provides an aerodynamic leading edge for the sail, and has a sleeve 38 for this purpose.

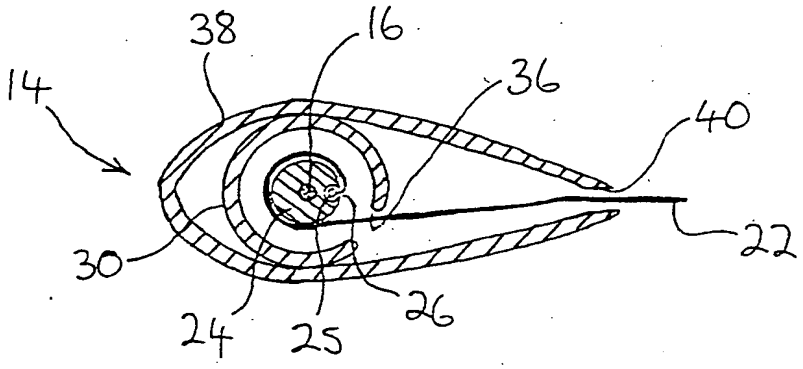

Fig.2

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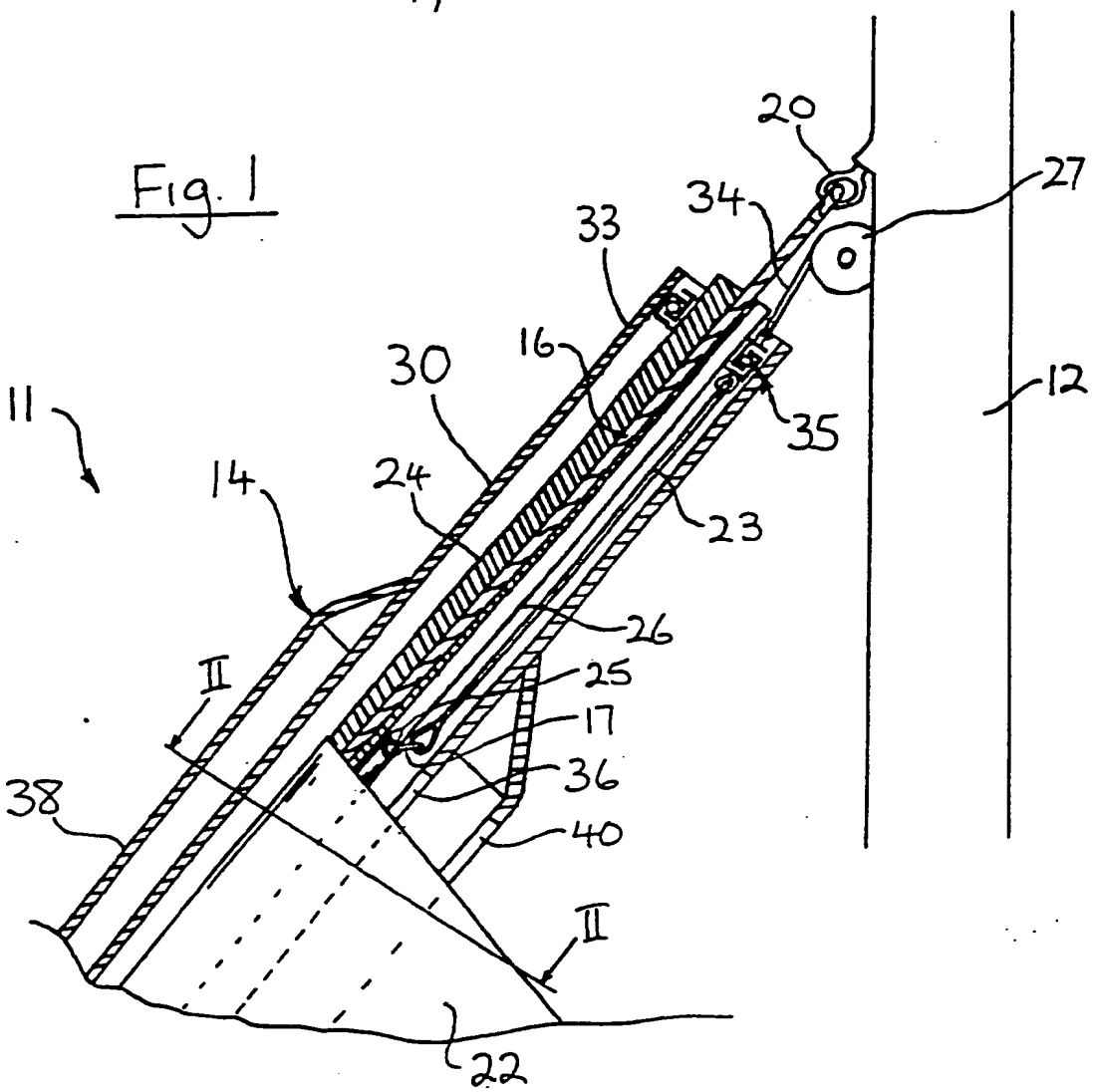
Fig. 1



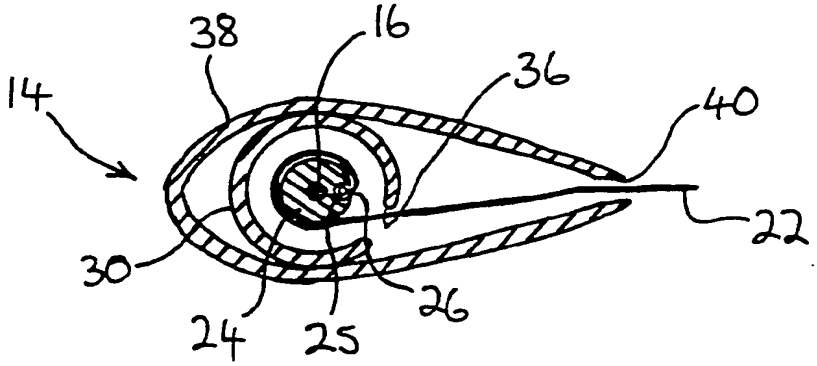


Fig. 2

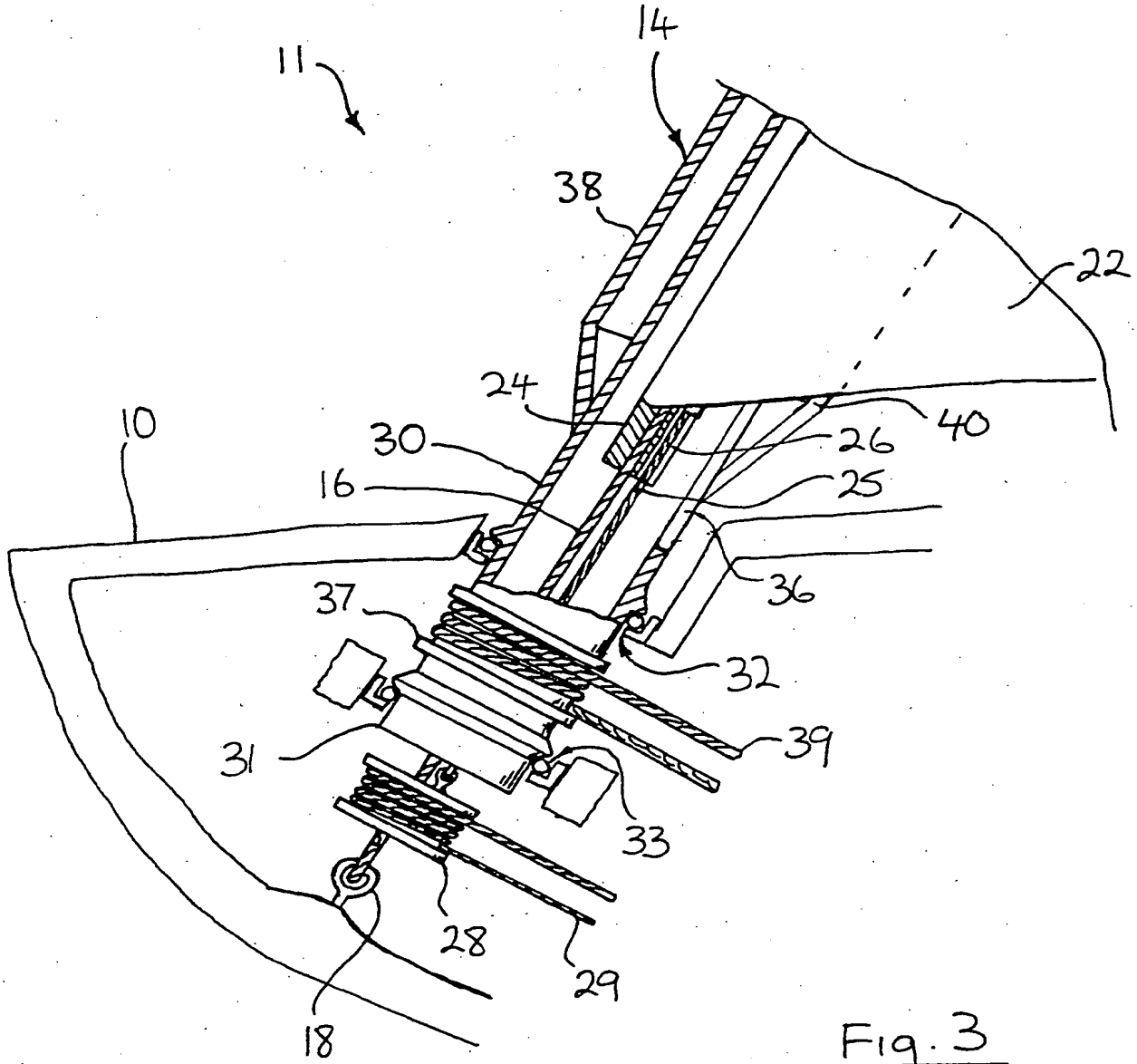


Fig. 3

Sail Cowling

The present invention relates to a rigging arrangement for sailing boats, and particularly to a cowling for a sail and more especially for a headsail.

The headsail of a sailing boat is that triangular sail which is set between a forestay, securing a leading edge of the sail, and a line (sheet), attaching the free corner of the sail to the hull of the boat. The forestay is connected between the mast of the boat and the bow. The headsail acts as an aerofoil and hence the forestay is arranged as rigid as possible to provide a straight line in order to maintain the aerodynamic efficiency of the sail. If the forestay is deflected by the wind acting on the sail, this efficiency is impaired. Consequently the forestay is tightened as far as practical in the circumstances. In some cases this may only be limited by the capacity of the mast to accept the strain imposed by the forestay.

However, where a forestay furling drum is incorporated in the forestay to enable the headsail to be furled to some extent to cater for different wind strengths, the circumstances are such that the degree to which the forestay can be tightened is limited by the necessity to enable the forestay to be rotated by the furling drum at any time. If the forestay is overtightened, this may render the furling drum impossible to rotate and hence this facility is lost or at least severely impaired. On the other hand, not being able to tighten the forestay has the undesirable effect that the efficiency of the sail is reduced by the flexing of the relatively loose forestay.

Although furling of the headsail is a useful feature in a sailing boat, because it enables the sailor to trim the sail to suit particular wind conditions, a furled sail does not always present the most aerodynamic of leading edges for the aerofoil formed by the sail. This is so particularly when the furling is on the leeward side of the sail, when the furling creates turbulence on that side of the sail

instead of encouraging a smooth, laminar air flow; and this of course further reduces the aerodynamic efficiency of the sail.

Where a furling drum is provided on the forestay, it is frequently the practice when in port, or when the headsail is not being used, to completely furl the sail around the forestay where it is stored in this position until it is next required. This is very convenient because the sail then does not need to be taken off the forestay. However, this method of storing is not good for the sail because it is then left open to the effects of the weather, particularly at its corner which is the last part of the sail to be wound around the forestay and is thus permanently exposed to the most harmful effects of wind, rain and sun, and will inevitably suffer deterioration over a period of time.

Nevertheless, even when roller reefing (as furling of a sail around a stay is usually referred to) is not employed, slackening of even a tight stay will occur in some conditions. Thus the forestay will inevitebly slacken when a boat gets off the wind onto a fetch or reach, and even in these conditions this results in some loss of performance of the sail.

Consequently it is an object of the present invention to provide a means whereby these problems are overcome, or their effects are at least mitigated.

In accordance with the present invention there is provided a cowling for the stay of a sail in a sailing boat, which stay extends between the hull of the boat and a mast thereof and supports a leading edge of the sail, said cowling comprising a substantially rigid tubular element extending between the points of attachment of the stay on the hull and the mast of the boat and having a slot extending along at least part of its length of a width slightly larger than the thickness of the sail but less than the diameter of the stay, and through which the sail passes, the cowling providing an aerodynamic leading edge for the sail. Preferably the cowling is of substantially constant cross section along its length.

Preferably the sail is the headsail and the stay is the forestay of the sailing boat and is mounted in the bow of the boat.

In accordance with another aspect of the present invention there is provided a cowling for the stay of a sail in a sailing boat, which stay extends between the hull of the boat and a mast thereof and supports a leading edge of the sail and has a furling drum to enable furling of the sail around the stay, said cowling comprising a substantially rigid tubular element extending between said drum and the mast of the boat and having a slot extending along at least part of its length of a width slightly larger than the thickness of the sail and through which the sail passes, the cowling providing an aerodynamic leading edge for the sail. Preferably the cowling is of substantially constant cross section along its length.

Preferably the cowling is rotatably mounted in the hull of the boat and is rotatably supported on the forestay adjacent the connection thereof to the mast. This allows the sail to turn the cowling into the wind depending on which tack the sail is presently set. On the other hand, the cowling may itself be provided with a drum and line enabling it to be rotated independently of the furling drum or the present tack of the sail by the sailor of the boat so that the cowling may be turned in which ever direction the sailor thinks fit.

The forestay is rotatable inside the cowling so that the sail can still be furled by operation of the furling drum in the usual way. Preferably the forestay is mounted in the hull below the deck level and the cowling is mounted in the deck. This has the advantage that the furling drum, which offers considerable aerodynamic friction, is removed from the air stream, together with the mounting for the cowling which can then also be arranged below deck level.

The mounting for the cowling preferably comprises at least one and preferably two bearings fixed in the hull of the boat above the furling drum and which support the weight of the cowling and

substantially fix it in the hull with rotation about its own axis being the only degree of freedom allowed. Thus in this region at least the cowling has a circular tubular section. Indeed it preferably has said tubular section throughout its length although its diameter may reduce towards the top of the sail.

Thus, when it is desired to store the sail, it can be furled (in the usual way) within the confines of the tubular section, so that the sail is substantially completely protected from the elements, particularly from uv radiation which is very harmful to some materials. The reducing diameter of the tubular section is allowed because a fully furled sail also has a reducing diameter towards the top of the forestay by virtue of the sail's triangular shape.

Above the level of the deck it is preferred that the cowling further comprises a sleeve around the tubular section which may be separate (and possibly fixed) to the tubular section or integral therewith. In any event the sleeve is shaped to provide aerodynamic efficiency, as well as strengthening the cowling generally if that is deemed necessary.

Because the cowling is substantially rigid it remains straight despite any tendency of the wind to deflect the forestay. The cowling is so shaped that it presents to the wind the most aerodynamically efficient of leading edges that an aerofoil can have. Any strain on the sail attempts to pull the forestay out of the slot in the cowling, but at any one point along the length of the cowling this will be insufficient to prise the cowling far enough apart to allow the forestay to pop out of the cowling. Thus the forestay can be arranged to be relatively slack since it is the cowling which keeps the leading edge of the headsail straight, and thus the operation of the furling drum is considerably facilitated.

The slot in the tubular section of the cowling preferably does not extend along the entire length of the cowling. Instead it is terminated above and below the sail in order to increase the strength

and rigidity of the cowling.

It will be appreciated that the sail can be carried on the forestay in the usual way, that is to say, by the forestay having fixed on it a circular section aluminium or like material moulding which has a C-shaped slot formed along its length. The edge of the sail is thickened by a bolt rope and this edge is fed up the slot. The side opening of the slot is not sufficient to allow the edge of the sail to be pulled out sideways, although the sail can be moved up and down the slot by a line attached thereto.

The invention also provides a boat fitted with a cowling as defined above.

The invention is further described hereinafter, by way of example only, with reference to the accompanying drawings, in which:-

Fig 1 illustrates in side view a section through the top part of a cowling according to the present invention;

Fig 2 is a section on the line II-II in Fig 1; and

Fig 3 is a similar view to Fig 1 through the bottom part of the cowling.

In Figs 1 and 3 of the drawings is shown the bow 10 of a sail boat 11 having a mast 12. Between the bow and mast is connected a forestay which comprises a cable 16 secured to the bow and mast by rotatable toggle type connections 18,20 respectively. The forestay 16 supports along its length a sail 22 whose free corner (not shown) is secured to the hull of the boat 11 by a line (also not shown).

The sail is connected to the forestay in known manner by a long clamp member 24 securely fixed on the cable 16. The clamp member 24 has a longitudinal C-shaped slot 26 whose internal diameter is

arranged to be slightly larger than the edge of the sail 22, which is thickened by being sewn to a bolt rope 25. The bolt rope 25 is fed into the base of the slot 26 and drawn up the slot by a line 23 attached to an eye 17 at the top corner of the sail 22. The line 23 is connected to the bottom of a rotatable ring coupling 35 which is a sliding and rotating fit about the clamp member 24. To the top of the coupling 35 is connected a line 34 which is passed over a pulley 27 mounted on the mast 12. When pulled further, the line 34 draws the coupling 35 up the clamp member 24 and the sail 22 follows up the slot 26 until it is correctly positioned on the forestay 16.

The forestay cable 16 and its clamp member 24 are arranged to be rotatable by a furling drum 28 mounted on the cable 16 just above the toggle connection 18. around the drum 28 is wound a line 29 whose ends are conveniently located for operation by the sailor in the cockpit or cabin of the boat. By pulling either end of this line the cable 16 is rotated and the sail 22 is wound on or unwinds from the cable 16 and clamp member 24 whereby the operational area of the sail 22 is trimmed to suit the prevailing wind conditions of the boat. The bottom end of the sail 22 is secured by the bolt rope 25 extending beneath the sail and being connected to an eye 13 fixed on the furling drum 28.

The present invention provides a cowling 14 around the forestay 16 and which comprises a substantially cylindrical tube 30. One end 31 of the tube 30 is rotatably mounted in the hull of the boat 11 by bearings 32,33. These carry the tube 30 and allow it to rotate about its own axis, but otherwise prevent any movement thereof. The other end 33 of the tube 30 is supported on the coupling 35 about which it is a sliding fit.

The tube 30 has a longitudinal slot 36 through which the sail 22 passes. This slot is not much wider than the thickness of the sail 22 and thus prevents the cable 16 and clamp member 24 from coming out of the confines of the tube 30. This can best be seen in Fig 2.

For the purposes of aerodynamic efficiency the cowling 14 further comprises a tear shaped sleeve 38 which surrounds the tube 30 and which also has a slot 40 for the sail 22. The sleeve 38 may be separate from the tube 30 or preferably it may from an integral part of the structure of the tube in order to increase the rigidity of the cowling which is fundamental to its purpose.

That is to say, the cowling 14 is intended to remain substantially straight under normal wind conditions so that it presents the most aerodynamically efficient shape possible in its role as the leading edge of the aerofoil constituted by the sail 22. However, the very wind conditions which drive the boat act through the sail 22 and tend to deflect the forestay cable 16 out of the straight line. Normally the mere tension in the cable 16 is employed to keep the cable straight, but here the cowling 14 performs that function. Nevertheless, the strain on the cable 16 by the sail 22 attempts to draw the cable 16 out of the tube 30 by prising the mouth of the slot 36 apart. Thus the tube must have the strength to prevent this from occurring, otherwise the purpose of the cowling will be lost. The sleeve 38 can be arranged to assist the tube 30 in this regard. Moreover it is primarily for this reason that the slot 36 does not extend along the entire length of the tube 30 but is terminated at either end to increase the strength and rigidity of the tube 30.

Because the tube 30 is rotatably mounted in the hull 11, it can pivot as the set of the sail 22 is changed during tacking and thus maintain the ideal edge to the wind. However, the set of the cowling 14 can be adjusted by the sailor of the boat 11 by a line 39 wound on a drum 37 formed on the end 31 of the tube 30.

It will be noted that the forestay 16 in the drawings is mounted on the hull of the boat 11 below the deck line of the boat. This is preferred because it takes the furling drum 28 out of the air stream and reduces the resulting drag on the boat. This arrangement is particularly suited to the present invention because the tube 30 can then also be mounted below deck level.

While the present invention finds particular application with the headsail of a boat, other sails of the same type could also benefit from a cowling according to the present invention where more than one of this sail arrangement is provided in a boat.

While the invention has been described with reference to specific elements and combinations of elements, it is envisaged that each element may be combined with any other or any combination of other elements. It is not intended to limit the invention to the particular combinations of elements suggested. Furthermore, the foregoing description is not intended to suggest that any element mentioned is indispensable to the invention, or that alternatives may not be employed. What is defined as the invention should not be construed as limiting the extent of the disclosure of this specification.

CLAIMS

1. A cowling for the stay of a sail in a sailing boat, which stay extends between the hull of the boat and a mast thereof and supports a leading edge of the sail, said cowling comprising a substantially rigid tubular element adapted to extend between the points of attachment of the stay on the hull and on the mast of the boat, and having a slot extending along at least part of its length of a width slightly larger than the thickness of the sail but less than the diameter of the stay, and through which slot the sail is adapted to pass, the cowling providing an aerodynamic leading edge for the sail.

2. A cowling for the stay of a sail in a sailing boat, which stay extends between the hull of the boat and a mast thereof, supports a leading edge of the sail and has a furling drum to enable furling of the sail around the stay, said cowling comprising a substantially rigid tubular element adapted to extend between said drum and the mast of the boat and having a slot extending along at least part of its length of a width slightly larger than the thickness of the sail but less than the diameter of the slay, and through which slot the sail is adapted to pass, the cowling providing an aerodynamic leading edge for the sail.

3. A cowling as claimed in claim 1 or 2, in which the sail is the headsail and the stay is the forestay of the sailing boat and is mounted in the bow of the boat.

4. A cowling as claimed in claim 1, 2 or 3, in which the cowling is rotatably mounted in the hull of the boat and is rotatably supported on the forestay adjacent the connection thereof to the mast.

5. A cowling as claimed in claim 4, in which the cowling is provided with a drum and line enabling it to be rotated by the sailor of the boat so that the cowling may be turned in which ever direction the sailor thinks fit.

6. A cowling as claimed in claim 5, when dependent on claim 2, in which the forestay is located in the hull below the deck level and the cowling is mounted in the deck.

7. A cowling as claimed in claim 6, in which the mounting for the cowling comprises at least one bearing fixed in the hull of the boat above the furling drum and which support the weight of the cowling and substantially fix it in the hull with rotation about its own axis being the only degree of freedom allowed, the cowling having in this region at least a circular tubular section.

8. A cowling as claimed in any preceding claim, in which the cowling has a tubular section throughout its length.

9. A cowling as claimed in claim 8, in which the diameter of said tubular section reduces towards the top of the sail.

10. A cowling as claimed in claim 9, in which the cowling further comprises a sleeve around the tubular section which is shaped to provide aerodynamic efficiency.

11. A cowling as claimed in claim 10 in which said sleeve is integrally formed with said tubular section.

12. A cowling as claimed in any preceding claim in which the slot in the cowling does not extend along the entire length of the cowling and is terminated above and below the sail in order to increase the strength and rigidity of the cowling.

13. A cowling as claimed in any preceding claim in which the sail is carried on the forestay by a circular section aluminium or like material moulding fixed on the forestay, which moulding has a C-shaped slot formed along its length and into which the edge of the sail, being thickened by a bolt rope, is adapted to be fed.

14. A cowling as claimed in any preceding claim in which the

cowling is of substantially constant cross section along its length.

15. A boat, fitted with a cowling as claimed in any preceding claim.

16. A cowling for a sailing boat, substantially as hereinbefore described with reference to the accompanying drawings.